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ADM-10.7

DD/S&T 4314/66
24 August 1966

MEMORANDUM FOR: All Office Directors, DD/S&T
Executive Officer, DD/S&T

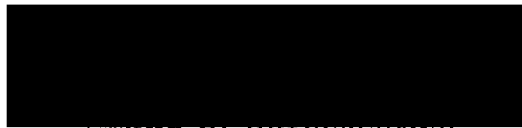
SUBJECT: Design Review Board Procedure for Project
Officer's Handbook

1. A draft of a Design Review Board procedure was circulated for your comments and recommendations on 14 June, 1966. From the comments, it was apparent that the language used in the procedure gave the impression that the procedure was mandatory for use on all R&D projects, and that the procedure was rigid and formal. I have re-written the procedure and introduced numerous changes to reflect both your comments and, hopefully, to present the objectives and the application of the procedure more clearly.

2. Some Offices indicated that the procedure was too formal and too detailed to be useful whereas others felt that a more elaborate procedure would be better. As indicated in the current draft, the objective is to make a procedure available to the Project Engineer which can be adapted to his requirements for review support, and I believe this can be readily done. OEL, for example, has used the original procedure on numerous occasions in the past with little problem in tailoring the process to the need.

3. Will you please review the current draft and let me have a marked up copy indicating your recommended changes or comments by close of business 2 September?

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Special Assistant to DD/S&T

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D R A F T

Project Officers Handbook

Para 1.4.2.2

DESIGN REVIEW BOARD PROCEDURE

12 August 1966

D R A F T

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1.4.2.2 Design Review Board Procedure

The Design Review Board procedure described in this section of the Handbook is not mandatory but may be exercised at the discretion of the Office Director.

1.4.2.2.1 Application

The uncertainties which are inherent in research and development programs result in a wide variety of problems. These problems may reflect the size, purpose, or other particulars of the project, or may arise because of the complexity of the program in which various inter-dependent components may be developed separately. To assist the Project Officer in the examination and resolution of these problems, a Design Review Board can objectively study critical problems for the Project Officer, and develop findings and recommendations for his consideration.

To be useful, a flexible procedure is needed whereby the Design Review Board process may be adapted to the particular needs of the program, and, at the same time, provide a degree of uniformity in order to simplify the reviews and ensure completeness. The equivalent of Design Review Board action has been conducted in the past in a wide variety of ways in order to satisfy the need for this type of review and the lack of an adaptable procedure has necessitated duplication of effort in the organizational and administration efforts for these reviews.

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The procedure provided herein is a "middle of the road" framework which is slanted toward questions of technical feasibility, reliability, and similar problems characteristic of medium and large hardware development projects, but which can also be tailored to other facets of R&D work including studies.

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Although it is anticipated that major projects, e. g. , over a [REDACTED] will generally find a DRB action desirable on two or three occasions during the life of the program, DRB action will not be worthwhile for most projects. The design Review Board and this procedure should be used thoughtfully and deliberately and should be tailored in each case to the Project Officer's problems and objectives. Even a minimal design review requires considerable effort, and if the design review is not done well, or if it is poorly organized or not well structured, it may do more harm than good.

A list of salient monitoring points, together with some of the factors which may be considered in these reviews is provided in Appendix A. In addition to these points suggested in Appendix A, this procedure may be used in other types of reviews if needed, such as:

Product Testing Reviews

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Specification Reviews

Study Program Results Reviews

Program Cost Reviews

1.4.2.2.2 Sequence

Although the need for DRB assistance may become apparent at any time during the progress of a program, possible DRB needs should be considered whenever a new program is started. Therefore, a DRB schedule should be recommended to the Office Director by the Project Officer when an equipment development program/contract is initiated.

The Project Officer, with approval of the Office Director, will select the DRB Chairman.

The DRB Chairman will select the DRB Members, make the arrangement for the meeting and conduct the review.

Within one week following conclusion of the review meeting(s), the DRB and the Project personnel should determine action to be taken on the DRB recommendations and issue a Memorandum for the Record describing this action.

Within three weeks following issue date of the memorandum, a final report should be issued. A single page may suffice for the memo

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or report of some Reviews; others which deal with complex problems may require much more documentation in order to provide an adequate record.

Recommendations to be implemented will be handled through existing channels by the Project Officer.

1.4.2.2.3 DRB Initiation

Each Project Officer in DD/S&T cognizant of equipment development is responsible for determining his needs for and initiating Design Review activity. The types of reviews required, when and where such reviews will be held in the program, and other germane aspects relative to the effective use of this evaluation technique are all part of this basic responsibility.

The implementation procedure described hereafter is intended to provide reasonably comprehensive guidance for the conduct of DRB's; appropriate modification of these procedures for any specific review should be recommended by the Project Office for Office Director concurrence at the time the DRB is scheduled. For relatively straightforward projects many items may be dropped or limited; for complex

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projects some supplementary definition and additional time beyond that indicated in this section may be necessary.

1.4.2.2.4 Organization

The Review Board Chairman will normally be selected from the DD/S&T organization. The Chairman, together with the designated project representative, should establish mutually agreeable objectives and adopt a schedule for the review. Except for very simple reviews, an informal memorandum should be published to pin down the following particulars:

1. The purpose and scope of the review,
2. The schedule of the review,
3. The location of the meeting,
4. All anticipated expenses of the review, including consultant fees, trips, man-hours, etc., with an appropriate project charge number,
5. The names of appointed meeting members,
6. The reports, prints, specifications, and other documents which are needed,
7. The parts, components, subassemblies, assemblies, and other hardware required,

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8. Requirements for consultants, vendor representatives, subcontractor representatives and military representatives,
9. A schedule for the delivery of documents and hardware before the meeting, if required,
10. Conditions, constraints, contingencies, or limitations bearing on the review,
11. Listing of applicable references,
12. Report distribution.

Both the Project Officer and the Office Director also should sign this memorandum indicating agreement with its planning and objectives.

1.4.2.2.5 Membership

In addition to the Chairman, representation as follows should be considered for the DRB:

1. At least one member from the Project Officer's Group, responsible for the presentation,
2. Technical specialist(s) having required skills; other divisions or projects of the Agency having such skills may be invited as consultants,
3. Consultants from outside agencies,
4. Vendor and contractor representatives,
5. Military personnel.

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It is important that the representatives appointed be technically qualified, but not so closely related to the product that an open viewpoint is precluded.

The Chairman will assure that all members of the DRB are properly notified and given adequate notice of the DRB meeting.

1.4.2.2.6 Schedule

The DRB meeting(s) should be scheduled far enough in advance to permit adequate planning and thorough study of applicable documents by the DRB members.

1.4.2.2.7 Conduct of the DRB Meeting

The Chairman of the DRB should formulate an agenda encompassing all of the review objectives and distribute it in advance of the meetings.

It is the responsibility of the Chairman to supervise the conduct of the meeting and to either act as, or appoint, a secretary to keep adequate records of the discussion and decisions.

The Chairman should conduct the review to fulfill the specified objectives within the allocated time. If completion within the scheduled period is impossible, the meetings may be continued with the approval of the Office Director. The Chairman may

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recommend continuing or follow-up action to satisfactorily complete the DRB business.

1.4.2.2.8 Critique

At the conclusion of the review presentations, and within two working days, if possible, the DRB should formulate in writing its recommendations for presentation. The DRB members and the Project Officer should then discuss and resolve the recommendations into the following categories, preferably within three working days:

1. To be implemented (with approximate date or effectivities), "
2. Not to be implemented,
3. To be referred to the Office Director for resolution.

The resolution results should then be published by memorandum.

Items to be implemented should be handled by the Project Officer through normal procedures.

1.4.2.2.9 Reports

Because DRB's are used to assist in problem areas, a formal report should be prepared by the DRB, covering the salient points of the meeting, recommendations and resolutions. For uniformity and simplicity, Appendix B (attached) may be used as a guide in preparing

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the report. Although the report may be very brief, the following shall usually be included:

- a. Title Page - should include the title, date, signatures and titles of each of the DRB representatives. Signatures indicate acceptance of the report. Dissenting or alternate viewpoints may be included in the discussion section or in appendices.
- b. Foreword - should note the project, contract number, the Engineering Directives establishing the review, etc.
- c. Table of Contents
- d. Summary
- e. Introduction
- f. Discussion - the body should include all pertinent board discussions, resolutions, findings, recommendations and conclusions. Other data, such as equations, test data, photographs, graphs, and charts may be included where deemed necessary for report completeness. Generally, detailed mathematical formulas and calculations should

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be found in the appendix.

- g. Conclusions
- h. Recommendations
- i. Appendices

Every effort should be made by the Chairman to complete the report within three weeks after conclusion of the DRB critique. Sufficient copies should be prepared to supply one to each of the DRB members, two copies to the Project Officer, one to the Office Director, and one to DD/S&T. Appropriate security procedures should be observed so copies of reports will be issued only to eligible personnel through normal distribution channels.

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APPENDIX A

1.4.2.2.10 Design and Development Monitoring Points

1. Monitoring Points

1.1 Design Concept Review

This phase starts with the contract award and culminates in a design report which includes studies of system and subsystem functions; schematics both electrical and mechanical; and in some cases physical layouts. There should be an overall system concept review to ascertain that the elements of the system are assigned the necessary and proper functions which will satisfy the use characteristics. Further, there may be a concept review of each system element to ascertain that its design will perform the assigned functions in the best possible manner. Of all the review which can be held, this is the most important and can have the most significant impact. It should be rarely be omitted on major, complex projects.

1.2 Prototype Design Review

Here the initial system design is nearly complete, and many component parts and assemblies have undergone some developmental testing. Some of the factors to be considered at this review are:

Adherence to Specifications: This includes specifications at all levels.

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Reliability: This is generally more easily measured quantitatively in a review of electronic equipment but is nonetheless important in mechanical reviews.

Safety of Personnel: Not only high-voltage killers, but also knuckle-nibbling burrs and sharp corners must be eliminated.

Appearance and Human-Engineering Factors: Equipment should be appropriately proportioned, and should "fit" people.

Economy of Manufacture: Value engineering factors are becoming more vital. For example, producing an expensive design and then changing it to something more economical may provide impressive "savings" on a monthly report; however, the design review can assure design economy from the outset.

Environmental Adequacy: The equipment should be designed to survive dust, heat, vibration, corrosion, fungus, shipping, and other natural and human outrages to which it will be subject.

Maintainability: The maintenance philosophy of each assembly, as well as that of the whole system, must be known and applied from the outset.

Compatibility: As the system grows in size and complexity, the problem of fitting the components together also grows.

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1.3 Prototype Demonstration (Hardware) Review

The first complete sets of hardware and/or major subsystem hardware items are available at this point and can be assembled into the general physical configuration that they will have when used. Laboratory testing has been conducted to demonstrate the compatibility of system and subsystems. Special test-vehicle flights to obtain data for design improvement are being performed. During this phase, all necessary research and engineering data are obtained and the basic design firmly established. This review should place special emphasis on ascertaining the compliance with specification performance and handling, shipping, environmental and similar characteristics. Items to be stressed are assembly and field problems arising from the initial bringing together of system elements.

1.4 Production Design Review

At this point, the production design of the system is essentially complete and the system is considered ready for production. This review should place special emphasis on attaining minimum costs for the system. It should include value analysis inputs for the deliverable hardware and should not ignore the more remote costs (aircraft, pilot training, fuel, etc.).

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1.5 Demonstration of Service Readiness

Here the contractor or the DD/S&T Office is required to show that the system which is usually built under a limited or pilot-production program has reached the reliability objectives, that the system can be produced without significant loss in performance or reliability. Depending upon the individual program schedule, this review may be combined with the Production Design Review (Paragraph 1.4).

1.6 Service Evaluation

During this phase, the actual user personnel perform their own equipment evaluation tests. If the system is found to be operationally acceptable and is capable of being produced in quantity without significant loss in reliability or performance, approval of production for service use is usually given at this monitoring point.

1.7 Full-Scale Production

The primary aim at this stage is to ensure that the level of reliability designed into the system is maintained during production.

1.8 Demonstration of Major Product Improvement

At this point, the reliability and overall value of major

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product improvements are demonstrated and may be approved for incorporation into the system.

2. Types of Investigations

There are several types of investigations which might be applicable to a system, subsystem, assembly, or part. Some of these types of investigations might be beneficially combined where the board members are experts in more than one field. Listed below are examples of the kind of reviews recommended (not in order of priority).

- a. Reliability
- b. Cost
- c. Environmental Design
- d. Maintainability
- e. Human Engineering
- f. System Concept
- g. Producibility
- h. Quality
- i. Test Philosophy
- j. Installation
- k. Electrical
- l. Mechanical

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- m. Thermal
- n. Safety
- o. Standardization

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APPENDIX B

1.4.2.2.11 Information for Design Review Documentation

1. Equipment Identification

Identify:

- a. system, subsystem, etc.
- b. phase of work that has been completed, i.e., final prototype,
- c. technical scope of review, i.e., circuit design, etc.

2. Review Board Membership

Identify Chairman, functional departments, project technical specialist representatives. Indicate mandatory members, i.e., reliability specialist.

3. Associated Documents List

Identify pertinent specifications and reports.

4. Time-Phased Program Chart

List recognizable development steps and dates. Include all test plans and design review dates.

5. System Integration Requirements

Include power inputs and required performance parameters. Discuss functions of equipment relative to system, list environments that affect performance and reliability.

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6. Circuit Design Evaluation

Discuss relation of proposed to previous design. Discuss alternate designs that have been considered.

7. Packaging Design Evolution

Discuss general construction and layout plan and relate to previous designs. Include weights estimates, sizes, structural materials, etc.

8. Design Analysis

Include calculations and test data that demonstrate that the design will meet the system requirements.

9. Reliability Calculations

Complete standard stress analysis and prediction. Use summary sheets in accordance with RADC-TN-58-18. Include reasons for predicting failure rates different from past experience data.

10. Parts and Processes

Discuss significant part types, include all non-standard parts and those for which failure rate data is not available. Discuss all procedures that are novel or for which effective and product inspections are not possible.

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11. Manufacturing and User Problems

Discuss human factors and machine availability. Evaluate problems due to novel features, difficulty of access, extreme tolerances, etc.

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